

Lesson 13: From Ratio Tables to Equations Using the Value of a Ratio

Classwork

Exercise 1

Jorge is mixing a special shade of orange paint. He mixed 1 gallon of red paint with 3 gallons of yellow paint.

Based on this ratio, which of the following statements are true? 1:3

- $\frac{3}{4}$ of a 4-gallon mix would be yellow paint. True $\frac{3}{4} \cdot \frac{4}{1} = \frac{12}{4} = 3$
- Every 1 gallon of yellow paint requires $\frac{1}{3}$ gallon of red paint. True
- Every 1 gallon of red paint requires 3 gallons of yellow paint. True
- There is 1 gallon of red paint in a 4-gallon mix of orange paint. True $1 + 3 = 4$
- There are 2 gallons of yellow paint in an 8-gallon mix of orange paint. False.

Use the space below to determine if each statement is true or false.

I Red $\frac{1}{3}$ part
 III Yellow $\frac{1}{3}$ parts

There are 6 gal. of yellow paint in an 8 gal. mix of orange paint.



Exercise 2

Based on the information on red and yellow paint given in Exercise 1, complete the table below.

Red Paint (R)	Yellow Paint (Y)	Relationship
1	3	$3 = 1 \times 3$
2	6	$6 = 2 \times 3$
3	9	$9 = 3 \times 3$
4	12	$12 = 4 \times 3$
5	15	$15 = 5 \times 3$



Exercise 3

- a. Jorge now plans to mix red paint and blue paint to create purple paint. The color of purple he has decided to make combines red paint and blue paint in the ratio 4:1. If Jorge can only purchase paint in one gallon containers, construct a ratio table for all possible combinations for red and blue paint that will give Jorge no more than 25 gallons of purple paint.

Blue (B)	Red (R)	Relationship
1	4	$4 = 1 \times 4$
2	8	$8 = 2 \times 4$
3	12	$12 = 3 \times 4$
4	16	$16 = 4 \times 4$
5	20	$20 = 5 \times 4$

Write an equation that will let Jorge calculate the amount of red paint he will need for any given amount of blue paint.

$$R = 4B$$

R = Red Paint
 B = Blue Paint.

Write an equation that will let Jorge calculate the amount of blue paint he will need for any given amount of red paint.

$$B = \frac{1}{4} R$$

If Jorge has 24 gallons of red paint, how much blue paint will he have to use to create the desired color of purple?

Jorge will have to use 6 gal. of blue paint.

$$B = \frac{1}{4} R$$

$$B = \frac{1}{4} (24) \text{ or } \frac{1}{4} \cdot \frac{24}{1} = \frac{24}{4}$$

$$= \frac{6}{1}$$

If Jorge has 24 gallons of blue paint, how much red paint will he have to use to create the desired color of purple?

Jorge will have to use 96 gal. of red paint.

$$R = 4B$$

$$R = 4(24)$$

$$R = 96$$

$$\begin{array}{r} 24 \\ \times 4 \\ \hline 96 \end{array}$$

- b. Using the same relationship of red to blue from above, create a table that models the relationship of the three colors blue, red, and purple (total) paint. Let B represent the number of gallons of blue paint, let R represent the number of gallons of red paint, and let T represent the total number of gallons of [purple] paint. Then write an equation that models the relationship between the blue paint and the total paint, and answer the questions.

Blue (B)	Red (R)	Total Paint (T)
1	4	5
2	8	10
3	12	15
4	16	20
5	20	25

Equation: $T = 5B$

$$\begin{array}{l} T = \text{Total} \\ B = \text{Blue} \end{array}$$

Value of the ratio of total paint to blue paint:

$$\frac{5}{1}$$

How is the value of the ratio related to the equation?

The value of the ratio is used to determine the total paint value by multiplying it with the blue paint value.

Exercise 4

During a particular U.S. Air Force training exercise, the ratio of the number of men to the number of women was 6:1. Use the ratio table provided below to create at least two equations that model the relationship between the number of men and the number of women participating in this training exercise.

Women (W)	Men (M)
1	6
2	12
3	18
4	24
5	30

Equations:

$$M = 6W$$

$$W = \frac{1}{6}M$$

$$\frac{M}{W} = 6$$

$$\frac{W}{M} = \frac{1}{6}$$



If 200 women participated in the training exercise, use one of your equations to calculate the number of men who participated.

$$M = 6(200)$$

$$M = 1,200$$

There would be 1,200 men participating in the training exercise.

Exercise 5

Malia is on a road trip. During the first five minutes of Malia's trip, she sees 18 cars and 6 trucks. Assuming this ratio of cars to trucks remains constant over the duration of the trip, complete the ratio table using this comparison. Let T represent the number of trucks she sees, and let C represent the number of cars she sees.

Trucks (T)	Cars (C)
1	3
3	9
6	18
12	36
20	60

What is the value of the ratio of the number of cars to the number of trucks?

$$\frac{3}{1}$$

What equation would model the relationship between cars and trucks?

$$C = 3T \text{ and } T = \frac{1}{3}C$$

At the end of the trip, Malia had counted 1,254 trucks. How many cars did she see?

$$C = 3(1,254)$$

$$C = 3T$$

$$\begin{array}{r} 1254 \\ \times 3 \\ \hline \end{array}$$

$$C = 3,762 \text{ Cars.}$$

Exercise 6

Kevin is training to run a half-marathon. His training program recommends that he run for 5 minutes and walk for 1 minute. Let R represent the number of minutes running, and let W represent the number of minutes walking.

Minutes Running (R)	5	10	20	40	50
Minutes Walking (W)	1	2	4	8	10

What is the value of the ratio of the number of minutes walking to the number of minutes running?

$$\frac{1}{5}$$

What equation could you use to calculate the minutes spent walking if you know the minutes spent running?

$$W = \frac{1}{5} R$$